

09/758078

3/6

CLAIMS

I claim:

1. (cancelled) An electromagnetic induction rotary device comprising a rotatable shaft and a fixed stator, said shaft and said stator fabricated of nickel-iron alloy having a predetermined coefficient of thermal expansion, said shaft supported for rotation within said stator on ceramic bearing assemblies, said bearing assemblies having the same said coefficient of thermal expansion.
2. (cancelled) An electromagnetic induction rotary device according to claim 1, said shaft being electrically isolated from said stator.
3. (cancelled) A partial-rotation, torque motor comprising
a reversibly rotatable shaft rotationally restricted to less than one full turn, and
a stator and housing assembly within which said shaft is located, said shaft supported by all ceramic ball bearing assemblies, each said assembly including a ceramic inner race mounted on said rotatable shaft and a ceramic outer race mounted in said housing and multiple ceramic bearing balls interspersed there between, said shaft said stator and said housing assembly fabricated of a nickel-iron alloy of matched expansion to said ceramic bearing assemblies, said shaft being electrically isolated from said stator and said housing.
4. (cancelled) A partial-rotation, torque motor according to claim 3, for use in a galvanometer scanner.
5. (currently amended) A galvanometer scanner ~~partial rotation torque motor~~ comprising a rotatable shaft supported by non-lubricated all ceramic ball bearing assemblies, said bearing assemblies supported by a bearing support structure, said shaft and said bearing support structure having substantially the same coefficient of thermal expansion as said ceramic bearing assemblies.

09/758078

4/6

6. (currently amended) A galvanometer scanner ~~partial rotation torque motor~~ according to claim 5, each said ceramic bearing assemblies comprising an ellipsoidal ceramic inner race, ceramic bearing balls, and an ellipsoidal ceramic outer race.
7. (currently amended) A galvanometer scanner ~~partial rotation torque motor~~ according to claim 5, said shaft and said bearing support structure fabricated of nickel-iron alloy.
8. (currently amended) A galvanometer scanner ~~partial rotation torque motor~~ according to claim 5, said shaft being electrically isolated from said bearing support structure.
9. (currently amended) A reciprocating partial rotation torque motor for use in a galvanometer scanner, comprising a rotatable shaft supported by at least two all ceramic ball bearing assemblies, said bearing assemblies supported by a bearing support structure, said shaft and said bearing support structure fabricated of nickel-iron alloy, each said ceramic bearing assemblies assembly comprising an ellipsoidal ceramic inner race, ceramic bearing balls, and an ellipsoidal ceramic outer race, said shaft and said bearing support structure having the same coefficient of thermal expansion as said ceramic bearing assemblies, said shaft being electrically isolated from said bearing support structure.
10. (currently amended) A reciprocating partial-rotation torque motor comprising
 - a reversibly rotatable shaft rotationally restricted to less than one full turn, and
 - a stator and housing assembly within which said shaft is located, said shaft supported by all ceramic ball bearing assemblies, each said assembly including a ceramic inner race mounted on said rotatable shaft and a ceramic outer race mounted in said housing and multiple ceramic bearing balls interspersed there between, said shaft said stator and said housing assembly fabricated of a nickel-iron alloy of matched thermal expansion to said ceramic bearing assemblies, said shaft being electrically isolated from said stator and said housing.

09/758078

5/6

11. (currently amended) A reciprocating partial-rotation torque motor according to claim 10, for use in a galvanometer scanner.
12. (currently amended) An electromagnetic induction reciprocating rotary device comprising a rotatable shaft supported for rotation by at least one all ceramic ball bearing assembly, said ball bearing assembly being supported by a bearing support structure wherein said shaft, said bearing support structure and said ~~all ceramic~~ ball bearing assembly have a substantially similar coefficient of thermal expansion.
13. (currently amended) An electromagnetic induction reciprocating rotary device according to claim 12, said rotatable shaft comprising a reversibly rotatable shaft rotationally restricted to less than one full turn.
14. (currently amended) An electromagnetic induction reciprocating rotary device according to any of claim 12, said bearing support structure comprising a stator and housing assembly within which said shaft is located, and wherein said all ceramic bearing assembly comprises a ceramic inner race and a ceramic outer race and multiple ceramic bearing balls interspersed there between.
15. (currently amended) An electromagnetic induction reciprocating rotary device according to claim 12, wherein said shaft and said bearing support structure are fabricated of a nickel-iron alloy having a substantially similar coefficient of thermal expansion to said all ceramic bearing assembly.
16. (currently amended) An electromagnetic induction reciprocating rotary device according to claim 12, wherein said shaft is electrically isolated from said bearing support structure.
17. (currently amended) An electromagnetic induction reciprocating rotary device according to claim 12, said device comprising a partial rotation torque motor for use in a galvanometer scanner.

09/758078

6/6

18. (currently amended) A method for providing improved shaft alignment, acceleration and bearing life in an electromagnetic induction rotary device comprising the steps:

supporting the shaft for rotation with an all ceramic bearing assembly comprising a ceramic inner race attached to the shaft, a ceramic outer bearing race and a plurality of ceramic rotating members captured there between;

supporting the bearing outer race in a fixed bearing support structure such that the ceramic outer race is stationary with respect to said inner race; and

fabricating the shaft and the bearing support structure from a material having a substantially similar coefficient of thermal expansion as the coefficient of thermal expansion of said all ceramic bearing assembly.

19. (currently amended) A method for providing improved shaft alignment, acceleration and bearing life according to claim 18, said material for said fabricating of the shaft and the bearing support structure comprising a nickel-iron alloy.

20. (currently amended) A method for providing improved shaft alignment, acceleration and bearing life according to claim 18, said electromagnetic induction rotary device comprising a partial rotation torque motor for use in a galvanometer scanner.

COPY RECEIVED

FEB 21 2003

TECHNOLOGY CENTER 8300